

# A VASCULAR FLORA OF THE SAN RAFAEL SWELL, UTAH<sup>1</sup>

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**ABSTRACT.**— The vegetation of the San Rafael Swell in southeastern Utah is examined based on personal field collections and previously collected herbarium specimens in the Brigham Young University Herbarium (BRY). An annotated checklist includes information on frequency of occurrence and habitat preference for each entity. Treated are 491 vascular plant taxa from 59 families.

The San Rafael Swell is the eroded remnant of a massive domal anticline, oval in shape, stretching along a northeasterly axis from Capitol Reef National Park in northern Wayne County to the foot of the Tavaputs Plateau in Carbon County. Folding of the earth's crust, which formed the domal anticline, and the subsequent erosion of the central dome left a huge area of concentric stone rings, each progressively younger from the innermost to the outermost. One of these rings, the Ferron Sandstone Member of the Mancos Shale Formation, encloses approximately 1.4 million acres of land and forms the boundary of this study. In some cases, where the Ferron Sandstone has been completely eroded from the structural confines of the swell, artificial boundaries have been followed (Fig. 1).

Throughout the field seasons of 1979 and 1980, I attempted to collect representatives of all vascular plant species growing in the San Rafael Swell. A voucher specimen from each collection has been placed in the Brigham Young University Herbarium (BRY). Included in the checklist are species not found by me, but collected by others and vouchered for by specimens in the Brigham Young University Herbarium. The checklist is not definitive; additional taxa will undoubtedly be discovered in the swell.

The following sources were used for identification and nomenclature: lower vascular plants and gymnosperms, Cronquist et al. (1972); dicotyledons, Neese and Welsh

(1981), Welsh (1978, 1980a, 1980b), Welsh and Atwood (1981), Welsh and Moore (1973), Welsh and Reveal (1977), Welsh et al. (1981); monocotyledons, Cronquist et al. (1977).

The checklist includes 478 vascular plant taxa found in the study area and an additional 13 taxa known to occur on lands immediately adjacent to the study area and to be expected in the San Rafael Swell. These 13 taxa are listed below:

*Allionia incarnata* L.  
*Cordylanthus wrightii* Gray  
*Descurainia pinnata* (Walter) Britt. var. *filipes* (Gray) Peck  
*Eriogonum smithii* Reveal  
*Euphorbia micromera* Boiss.  
*Haplopappus drummondii* (T. & G.) Blake  
*Helianthus petiolaris* Nutt.  
*Hymenopappus filifolius* Hook. var. *lugens* (Greene) Jeps.  
*Lupinus pusillus* Pursh var. *rubens* (Rydb.) Welsh  
*Phacelia demissa* Gray var. *heterotricha* Howell  
*Physocarpus alternans* (Jones) Howell  
*Sphaeralcea munroana* (Dougl.) Spach  
*Sporobolus giganteus* Nash

The flora of the San Rafael Swell is not particularly rich in numbers of species. This is due, at least in part, to the relatively narrow elevational range in the area. Although not rich in numbers of species, the flora is rather rich in numbers of unique and geographically restricted species. The following eight species are strictly endemic to the San Rafael Swell:

*Astragalus rafaensis* Jones  
*Cryptantha johnstonii* Higgins  
*Cryptantha jonesiana* (Payson) Payson  
*Erigeron maguirei* Cronquist

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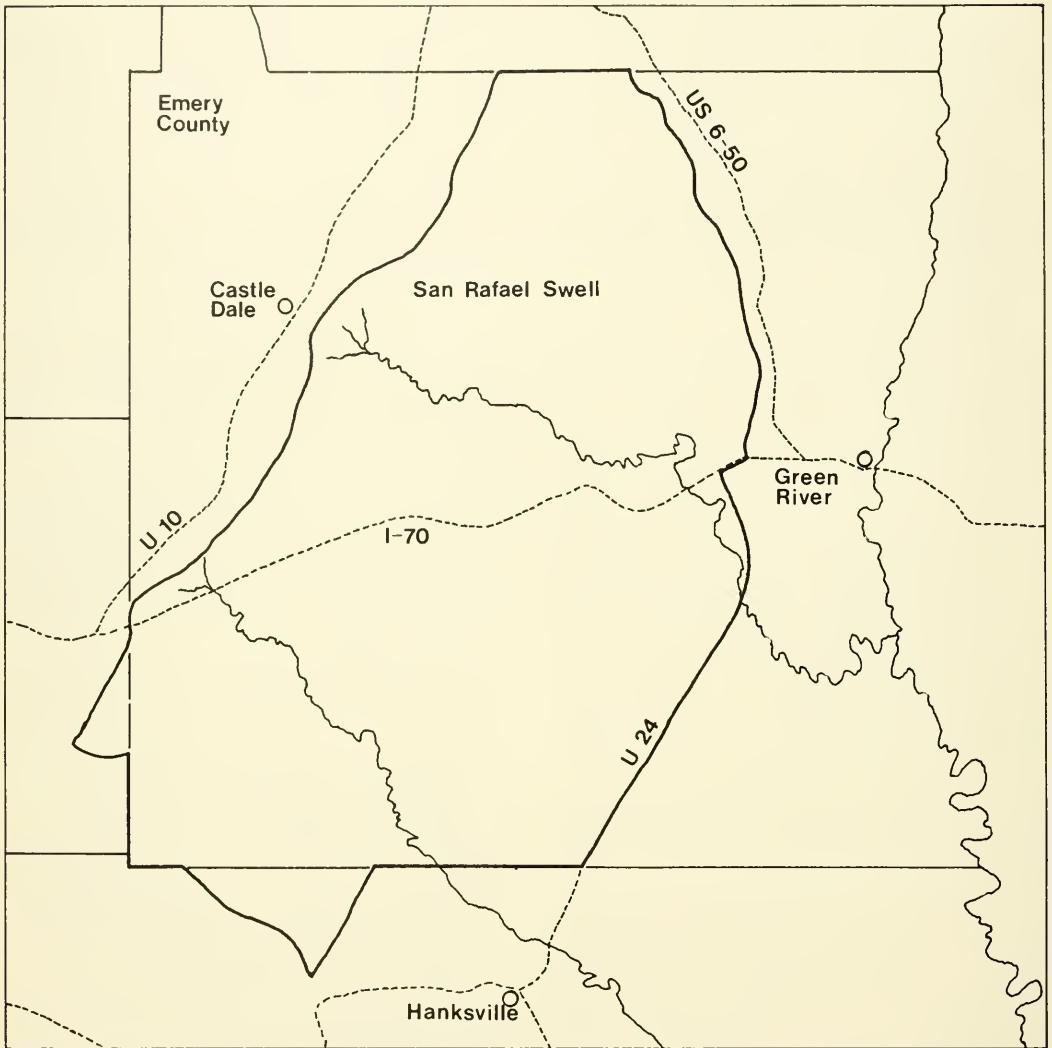


Fig. 1. Map of the San Rafael Swell study area.

*Pediocactus despainii* Welsh & Goodrich  
*Sclerocactus wrightii* Benson  
*Sphaeralcea psoraloides* Welsh  
*Thelypodopsis barnebyi* Welsh & Atwood

An additional seven species are endemic to the San Rafael Swell and the adjacent lands in close proximity to the swell. They are listed as follows:

*Astragalus pardalinus* (Rydb.) Barneby  
*Astragalus woodruffii* Jones  
*Hoffmanseggia repens* (Eastw.) Cockerell  
*Hymenoxys depressa* (T. & G.) Welsh & Reveal  
*Lomatium junceum* Barneby & Holmgren  
*Psoralea polyadenius* (Torr.) Rydb. var. *jonesii* Barneby  
*Townsendia aprica* Welsh & Reveal

#### VEGETATIVE ZONES

The vegetation of the San Rafael Swell can be divided into five major zones: the Sand Desert Shrub Zone, the Salt Desert Shrub Zone, the Mixed Desert Shrub Zone, the Pinyon-Juniper Zone, and the Ponderosa Pine-Mountain Brush Zone. These zones are controlled principally by elevation, precipitation, and local edaphic factors. Although in some areas the zones are clear and well defined, in most areas they interfuse considerably and it becomes difficult to draw a sharp boundary line between them.

**SAND DESERT SHRUB ZONE.**— The San Rafael Desert, in the southeastern region of the San Rafael Swell, ranges from an elevation of about 4200 ft (1280 m) at the lowest point to about 5000 ft (1524 m) at the highest point. It is a sandy desert with moving dunes in some areas. Common shrubs in this zone include: *Artemisia filifolia*, *Ephedra torreyana*, *Yucca harrimaniae*, *Poliomintha incana*, *Tiquilia latior*, and *Coleogyne ramosissima*. *Abronia elliptica*, *Oenothera pallida*, *Hoffmanseggia repens*, and *Oryzopsis hymenoides* are characteristic herbaceous plants of this zone.

**SALT DESERT SHRUB ZONE.**— In the San Rafael Swell the Salt Desert Shrub Zone is widespread, occurring mainly on alkaline clay soils between 4500 and 5800 ft (1372–1766 m) in elevation. Communities in this zone are characteristically dominated by *Atriplex confertifolia* interspersed with any of the following subdominant species: *Hilaria jamesii*, *Oryzopsis hymenoides*, *Enceliopsis nudicaulis*, *Aristida purpurea*, *Eriogonum inflatum*, *Salsola iberica* or *Ceratoides lanata*.

Highly alkaline flood plains in this zone are often covered by nearly pure stands of *Sarcobatus vermiculatus*, which may at times be accompanied by thick clumps of *Tamarix ramosissima*.

Heavy clay soils of the Mancos Shale Formation are often dominated by *Atriplex cuneata* and *Atriplex corrugata*. During wet springs these areas may be blanketed by annual species such as *Cleome lutea*, *Lupinus pusillus*, *Malcolmia africana*, *Camissonia sca-poidea*, and *Camissonia eastwoodiae*.

**MIXED DESERT SHRUB ZONE.**— Deep, well-drained soils between 4500 and 5800 ft (1372–1766 m) in elevation are often dominated by one or several of the following shrubby species: *Artemisia tridentata*, *Artemisia bigelovii*, *Artemisia spinescens*, *Xanthocephalum sarothrae* or *Chrysothamnus viscidiflorus*. These may be intermingled with an understory of herbaceous plants including: *Hilaria jamesii*, *Stipa comata*, *Bouteloua gracilis*, *Astragalus* spp., *Sphaeralcea* spp., and *Leucelene ericoides*.

**PINYON-JUNIPER ZONE.**— *Pinus edulis* and *Juniperus osteosperma* are conspicuously dominant at elevations between 5800 and

7800 ft (1766–2377 m). Within this altitudinal range *Juniperus osteosperma* is dominant at the lower elevations and *Pinus edulis* is dominant at the higher elevations. Intermediate elevations yield a heterogeneous mixture of both species.

Dense stands have almost no understory, but more open or scattered stands will include almost all the species found in the Mixed Desert Shrub Zone.

**PONDEROSA PINE-MOUNTAIN BRUSH ZONE.**— The highest point in the San Rafael Swell is the San Rafael Knob at 7921 ft (2414 m) in elevation. The area surrounding the knob and the summit of Cedar Mountain represent the highest vegetative zone in the swell. *Pinus edulis* continues to remain dominant even at the highest elevations, but above 7500 ft (2286 m) plants characteristic of the Ponderosa Pine-Mountain Brush Zone become increasingly common. Some common species in this zone are: *Pinus ponderosa*, *Artemisia nova*, *Cowania mexicana*, *Mahonia fremontii*, *Populus tremuloides*, *Amelanchier utahensis*, *Cercocarpus montanus*, *Ribes leptanthum*, *Juniperus scopulorum*, *Hymenoxys richardsonii*, *Symphoricarpos longiflorus* and *Philadelphus microphyllus*.

In addition to these five major vegetative zones, smaller communities dependent on unique local habitats are scattered throughout the area. These include plants distributed along seeps and streams, along washes and roadsides where runoff collects, in hanging gardens, on rocky outcrops, and on disturbed sites.

#### ANNOTATED CHECKLIST

Following each species entry in the checklist (with the exception of the 13 taxa from lands adjacent to the study area) a designation is given concerning the frequency of occurrence and habitat preference of the taxon. Plants of broad distribution that are not limited to a specific zone or community type are listed as widespread. The following abbreviations are used:

- C—common
- O—occasional
- U—uncommon
- R—rare
- SnD—Sand Desert Shrub Zone
- SD—Salt Desert Shrub Zone
- MD—Mixed Desert Shrub Zone
- PJ—Pinyon-Juniper Zone

PM—Ponderosa Pine-Mountain Brush Zone  
 SS—Seeps and streams  
 WR—Washes and roadsides  
 HG—Hanging gardens  
 RO—Rocky outcrops  
 DS—Disturbed sites  
 W—Widespread

## ACERACEAE

*Acer glabrum* Torr. (R;PM)

## ANACARDIACEAE

*Rhus trilobata* Nutt. var. *simplicifolia* (Greene) Barkl. (C;WR)

*Rhus trilobata* Nutt. var. *trilobata* (C;WR)

*Toxicodendron rydbergii* (Small) Greene (C;SS,HG)

## APIACEAE

*Cymopterus acaulis* (Pursh) Raf. (O;SnD,SID)

*Cymopterus bulbosus* Nels. (C;W)

*Cymopterus fendleri* Gray (C;W)

*Cymopterus purpurascens* (Gray) Jones (O;SID)

*Cymopterus purpureus* Wats. (O;W)

*Lomatium junceum* Barneby & Holmgren (R;SID,MD,PJ)

*Sium suave* Walt. (R;WR)

## APOCYNACEAE

*Amsonia eastwoodiana* Rydb. (C;SnD)

*Amsonia jonesii* Woodson (O;MD,PJ)

*Apocynum cannabinum* L. (C;SS,HG)

*Cycladenia humilis* Benth. var. *jonesii* (Eastw.) Welsh & Atwood (R;MD)

## ASCLEPIADACEAE

*Asclepias cryptoceras* Wats. (C;W)

*Asclepias labriformis* Jones (C;WR,SD,MD)

*Asclepias macrosperma* Eastw. (C;SnD,MD)

*Asclepias ruthiae* Maguire & Woodson (O;W)

*Asclepias speciosa* Torr. (C;WR)

## ASTERACEAE

*Ambrosia acanthicarpa* Hook. (O;SID,MD,PJ)

*Ambrosia artemisiifolia* L. (C;SID,MD,PJ)

*Artemisia biennis* Willd. (U;WR)

*Artemisia bigelovii* Gray (C;MD,PJ)

*Artemisia campestris* L. (U;SnD,MD)

*Artemisia dracunculus* L. (C;WR)

*Artemisia filifolia* Torr. (C;SnD)

*Artemisia frigida* Willd. (R;WR)

*Artemisia ludoviciana* Nutt. (O;WR)

*Artemisia nova* Nels. (C;PJ,PM)

*Artemisia pygmaea* Gray (O;SID,MD,PJ)

*Artemisia spinescens* Eaton (O;SID,MD)

*Artemisia tridentata* Nutt. (C;MD,PJ,WR)

*Aster glaucodes* Blake (U;PM)

*Baccharis emoryi* Gray (U;WR)

*Brickellia longifolia* Wats. (U;WR)

*Brickellia microphylla* (Nutt.) Gray (U;WR)

*Brickellia oblongifolia* var. *linifolia* (Eaton) Robins (O;PJ,WR)

*Brickellia scabra* (Gray) Nels. (R;HG,WR)

*Chaenactis stevioides* Hook. & Arn. (C;SID,MD)

*Chamaechaenactis scaposa* (Eastw.) Rydb. (O;PJ)

*Chrysothamnus greenei* (Gray) Greene (O;SID)

*Chrysothamnus linifolius* Greene (O;WR)

*Chrysothamnus nauseosus* (Pall.) Britt. var. *consimilis* (Greene) Hall (C;WR)

*Chrysothamnus nauseosus* (Pall.) Britt. var. *gnaphaloides* (Greene) Hall (U;WR)

*Chrysothamnus nauseosus* (Pall.) Britt. var. *junceus* (Greene) Hall (U;WR)

*Chrysothamnus nauseosus* (Pall.) Britt. var. *leiospermus* (Gray) Hall (R;WR)

*Chrysothamnus pulchellus* (Gray) Greene (U;WR)

*Chrysothamnus viscidiflorus* (Hook.) Nutt. var. *stenophyllus* (Gray) Hall (U;WR)

*Chrysothamnus viscidiflorus* (Hook.) Nutt. var. *viscidiflorus* (C;WR)

*Cirsium pulchellum* (Greene) Woot. & Standl. (U;WR)

*Cirsium undulatum* (Nutt.) Spreng. (C;WR)

*Dicoria canescens* Gray (U;SnD)

*Encelia frutescens* Gray (U;WR)

*Enceliopsis nudicaulis* (Gray) Nels. (C;SID,MD)

*Enceliopsis nutans* (Eastw.) Nels. (C;SID,MD)

*Erigeron argentatus* Greene (O;SID,MD,PJ)

*Erigeron compactus* Blake var. *consimilis* Cronquist (O;MD,PJ)

*Erigeron divergens* T. & G. (U;PJ)

*Erigeron eatonii* Gray (U;PJ,PM)

*Erigeron maguirei* Cronquist (R;WR)

*Erigeron pulcherrimus* Heller var. *pulcherrimus* (C;SID,MD,PJ)

*Erigeron pumilus* Nutt. ssp. *concinoides* Cronq. var. *condensatus* (Eaton) Cronq. (C;SID,MD,PJ)

*Erigeron utahensis* Gray (C;WR,RO)

*Gaillardia pinnatifida* Torr. (C;SID,MD)

*Gaillardia spathulata* Gray (C;SID,MD,PJ)

*Grindelia squarrosa* (Pursh) Dunal. (O;WR)

*Haplopappus armerioides* (Nutt.) Gray (C;MD,PJ,RO)

*Haplopappus drummondii* (T. & G.) Blake

*Helianthella microcephala* (Gray) Gray (C;PJ,PM)

*Helianthus annuus* L. (C;WR)

*Helianthus anomalous* Blake (C;SnD)

*Helianthus petiolaris* Nutt.

*Heterotheca villosa* (Pursh) Shinnars (C;SID,MD,PJ)

*Hymenopappus filifolius* Hook. var. *lugens* (Greene) Jeps.

*Hymenopappus filifolius* Hook. var. *megacephalus* Turner (C;SID,MD)

*Hymenopappus filifolius* Hook. var. *pauciflorus* (Johnst.) Turner (O;SID)

*Hymenoxys acaulis* (Pursh) Parker var. *arizonica* (Greene) Parker (C;MD,PJ)

*Hymenoxys depressa* (T. & G.) Welsh & Reveal (O;RO)

*Hymenoxys richardsonii* (Hook.) Cockerell (C;PJ,PM)

*Iva axillaris* Pursh (O;SS,WR)

*Iva xanthifolia* Nutt. (O;WR)

*Lyceum ericoides* (Torr.) Greene (C;W)

*Lygodesmia arizonica* Tomb (C;SID,MD,WR)

*Lygodesmia grandiflora* (Nutt.) T. & G. (C;SID)

*Lygodesmia juncea* (Pursh) D. Don (R;SnD)

*Machaeranthera canescens* (Pursh) Gray (R;SnD)

*Machaeranthera grindelioides* (Nutt.) Shinnars (C;W)

*Machaeranthera linearis* Greene (U;WR)

*Machaeranthera tanacetifolia* (H.B.K.) Nees (C;WR)

*Malacothrix sonchoides* (Nutt.) T. & G. (C;SID,MD)

*Oxytena acerosa* Nutt. (C;SS,WR)

*Parthenium ligulatum* (Jones) Barneby (U;SID,MD,PJ)

*Petradoria pumila* (Nutt.) Greene (C;PJ,WR,RO)

*Platyschukhria integrifolia* (Gray) Rydb. var. *oblongifolia* (Gray) Ellison (C;WR)

*Prenanthes exigua* (Gray) Rydb. (C;WR,RO)

*Senecio multcapitatus* Greenm. (U;PJ,PM,WR)

- Senecio multilobatus* T. & G. (O;PJ,WR) +  
*Stephanomeria exigua* Nutt. (O;WR)  
*Stephanomeria runcinata* Nutt. (R;WR)  
*Stephanomeria spinosa* (Nutt.) Tomb (U;WR)  
*Stephanomeria tenuifolia* (Torr.) Hall (C;WR,RO)  
*Taraxacum officinale* Weber (C;SS)  
*Tetradymia canescens* DC. (O;PJ,PM)  
*Tetradymia glabrata* Gray (C;MD,PJ)  
*Tetradymia spinosa* Hook. & Arn. (O;WR)  
*Thelesperma subnudum* Gray (C;W)  
*Townsendia annua* Beaman (U;MD)  
*Townsendia aprica* Welsh & Reveal (U;SID,MD,PJ)  
*Townsendia incana* Nutt. (C;SID,MD,PJ)  
*Tragopogon dubius* Scop. (C;W)  
*Vanclveea stylosa* (Eastw.) Greene (C;SnD)  
*Wyethia scabra* Hook. (C;WR)  
*Xanthium strumarium* L. (O;SS)  
*Xanthocephalum microcephalum* (DC.) Shinners (R;PJ)  
*Xanthocephalum sarothrae* (Pursh) Shinners (C;SID,MD,PJ)  
*Xylorhiza venusta* (Jones) Heller (C;RO)
- BERBERIDACEAE**
- Mahonia fremontii* (Torr.) Fedde (C;MD,PJ)
- BETULACEAE**
- Betula occidentalis* Hook. (R;SS)
- BORAGINACEAE**
- Cryptantha cinerea* Greene (R;PJ,PM)  
*Cryptantha confertifolia* (Greene) Payson (R;SnD)  
*Cryptantha crassispala* (T. & G.) Greene var. *elachantha* Johnst. (C;W)  
*Cryptantha flava* (Nels.) Payson (C;W)  
*Cryptantha flavoculata* (Nels.) Payson (C;PJ)  
*Cryptantha fulvocanescens* (Wats.) Payson var. *echinoides* (Jones) Higgins (O;SID)  
*Cryptantha fulvocanescens* (Wats.) Payson var. *fulvocanescens* (C;MD,PJ)  
*Cryptantha gracilis* Osterh. (U;PJ)  
*Cryptantha humilis* (Gray) Payson var. *nana* (Eastw.) Higgins (O;PJ)  
*Cryptantha jamesii* (Torr.) Payson var. *disticha* (Eastw.) Payson (U;MD,WR)  
*Cryptantha jamesii* (Torr.) Payson var. *setosa* (Jones) Johnst. (C;PJ)  
*Cryptantha johnstonii* Higgins (U;SID)  
*Cryptantha jonesiana* (Payson) Payson (U;SID)  
*Cryptantha mensana* (Jones) Payson (O;SID)  
*Cryptantha paradoxa* (Nels.) Payson (O;PJ)  
*Cryptantha recurvata* Coville (O;MD,PJ,WR)  
*Cryptantha rollinsii* Johnst. (O;MD,PJ,WR)  
*Cryptantha tenuis* (Eastw.) Payson (O;WR)  
*Cryptantha wetherillii* (Eastw.) Payson (O;SID)  
*Heliotropium convulvulaceum* (Nutt.) Gray (U;SnD)  
*Lappula occidentalis* (Wats.) Greene var. *cupulata* (Gray) Higgins (R;MD,PJ)  
*Lappula occidentalis* (Wats.) Greene var. *occidentalis* (C;W)  
*Lithospermum incisum* Lehm. (C;PJ)  
*Tiquilia latior* (Johnst.) Richardson (O;SID,MD)
- BRASSICACEAE**
- Arabis demissa* Greene var. *lanugida* Rollins (R;PJ,PM)  
*Arabis perennans* Wats. (O;PJ)  
*Arabis pulchra* Jones var. *pallens* Jones (O;PJ)  
*Arabis selbyi* Rydb. (C;PJ)  
*Caulanthus crassicaulis* (Torr.) Wats. (C;PJ)  
*Chorispora tenella* (Pall.) DC. (U;DS)  
*Descurainia pinnata* (Walt.) Britt. var. *filipes* (Gray) Peck  
*Descurainia pinnata* (Walt.) Britt. var. *intermedia* (Rydb.) Hitchc. (U;MD)  
*Descurainia pinnata* (Walt.) Britt. var. *osmarium* (Cockerell) Shinners (C;W)  
*Descurainia sophia* (L.) Webb. (O;WR)  
*Dithyrea wislizenii* Engelm. in Wisliz. (O;SnD)  
*Lepidium densiflorum* Schrad. var. *pubicarpum* (Nels.) Thell. (R;PJ)  
*Lepidium densiflorum* Schrad. var. *ramosum* (Nels.) Thell. (O;MD,PJ)  
*Lepidium montanum* Nutt. var. *jonesii* (Rydb.) Hitchc. (C;W)  
*Lesquerella alpina* (Nutt.) Wats. var. *alpina* (O;PJ,PM)  
*Lesquerella intermedia* (Wats.) Heller (O;PJ,PM)  
*Lesquerella kingii* Wats. (R;PJ)  
*Lesquerella rectipes* Wood. & Standl. (C;W)  
*Lesquerella subumbellata* Rollins (U;PJ,PM)  
*Malcolmia africana* (L.) R. Br. in Ait. (C;SID,DS)  
*Physaria acutifolia* Rydb. (C;PJ)  
*Physaria chambersii* Rollins (U;PJ)  
*Schoenocrambe linifolia* (Nutt.) Greene (O;PJ,PM)  
*Sisymbrium altissimum* L. (C;PJ,PM)  
*Stanleya pinnata* (Pursh) Britt. (C;SID)  
*Stanleya viridiflora* Nutt. in T. & G. (U;MD,PJ)  
*Streptanthella longirostris* (Wats.) Rydb. (C;W)  
*Streptanthus cordatus* Nutt. ex T. & G. (C;PJ)  
*Thelypodopsis barnebyi* Welsh & Atwood (R;MD)  
*Thelypodopsis divaricata* (Rollins) Welsh & Reveal (C;SID,MD,PJ)
- CACTACEAE**
- Coryphantha vivipara* (Nutt.) Britt. & Rose (O;PJ)  
*Echinocereus triglochidiatus* Engelm. var. *melanacanthus* (Engelm.) Benson (C;SID,MD,PJ)  
*Opuntia basilaris* Engelm. & Bigel. (O;SnD,MD,PJ)  
*Opuntia erinacea* Engelm. (O;SnD)  
*Opuntia polyacantha* Haw. (C;W)  
*Pediocactus despainii* Welsh & Goodrich (R;PJ)  
*Pediocactus simpsonii* (Engelm.) Britt. & Rose (R;PJ)  
*Sclerocactus parviflorus* Clover & Jotter var. *intermedius* (Peebles) Woodruff & Benson (C;W)  
*Sclerocactus wrightiae* Benson (U;SID,MD,PJ)
- CAPPARIDACEAE**
- Cleome lutea* Hook. (C;SID)  
*Cleome serrulata* Pursh (O;PJ)  
*Cleomella palmerana* Jones (O;PJ)
- CAPRIFOLIACEAE**
- Sambucus coerulea* Raf. (U;PJ,PM)  
*Symphoricarpos longiflorus* Gray (O;PJ,PM)
- CARYOPHYLLACEAE**
- Arenaria eastwoodiae* Rydb. (C;PJ)  
*Arenaria fendleri* Gray (C;SID)  
*Arenaria hookeri* Nutt. var. *desertorum* Maguire (R;PJ)  
*Paronychia sessiliflora* Nutt. (O;PJ,WR)
- CELASTRACEAE**
- Forsellesia meionandra* (Koehne) Heller (O;PJ,RO)
- CHENOPODIACEAE**
- Allenrolfea occidentalis* (Wats.) Kuntze (O;SID)  
*Atriplex argentea* Nutt. (U;SID)  
*Atriplex canescens* (Pursh) Nutt. (C;SID,MD)  
*Atriplex confertifolia* (Torr. & Frem.) Wats. (C;SID)  
*Atriplex corrugata* Wats. (C;SID)

- Atriplex cuneata* Nels. (C;SID)  
*Atriplex graciliflora* Jones (U;SID)  
*Atriplex powellii* Wats. (C;SID)  
*Atriplex saccaria* Wats. (U;MD)  
*Bassia hysopifolia* Pallas (U;WR)  
*Ceratoides lanata* (Pursh) Howell (C;SID)  
*Chenopodium fremontii* Wats. (C;W)  
*Chenopodium glaucum* L. (O;SID)  
*Chenopodium pratericola* Rydb. (C;SS)  
*Grayia brandegei* Gray (U;MD)  
*Halogeton glomeratus* (Bieb.) Meyer (C;DS)  
*Kochia iranica* Bornm. (C;WR)  
*Kochia americana* Wats. (R;SID,WR)  
*Monolepis nuttalliana* (Schult.) Greene (O;WR)  
*Salsola iberica* Sennen & Pau (C;W)  
*Sarcobatus vermiculatus* (Hook.) Torr. (C;SID,SS,WR)  
*Suaeda torreyana* Wats. (C;SS,WR)
- CONVOLVULACEAE
- Convolvulus arvensis* L. (C;WR)  
*Cuscuta cuspidata* Engelm. (C;MD)
- CUPRESSACEAE
- Juniperus osteosperma* (Torr.) Little (C;PJ,PM)  
*Juniperus scopulorum* Sarg. (U;PM)
- CYPERACEAE
- Carex filifolia* Nutt. (C;SS)  
*Carex parryana* Dewey (R;SS)  
*Eleocharis palustris* (L.) Roemer & Schult. (O;SS)  
*Eleocharis rostellata* (Torr.) Torr. (U;SS)  
*Scirpus maritimus* L. (O;SS)  
*Scirpus pungens* Vahl. (C;SS)  
*Scirpus validus* Vahl. (O;SS)
- ELAEAGNACEAE
- Shepherdia rotundifolia* Parry (U;PJ)  
*Shepherdia argentea* (Pursh) Nutt. (U;WR)
- EPHEDRACEAE
- Ephedra torreyana* Wats. (C;W)  
*Ephedra viridis* Coville (C;W)
- EQUISETACEAE
- Equisetum laevigatum* A. Br. (C;SS)
- EUPHORBACEAE
- Euphorbia albomarginata* T. & G. (U;PJ)  
*Euphorbia fendleri* T. & G. (C;SID,MD,PJ)  
*Euphorbia micromera* Boiss.  
*Euphorbia nephradenia* Barneby (R;SID,WR)  
*Euphorbia palmeri* Engelm. (R;SID)  
*Euphorbia parryi* Engelm. (C;SnD)  
*Euphorbia robusta* (Engelm.) Small (O;PJ,PM)  
*Euphorbia serphyllifolia* Pers. (C;PJ,PM)
- FABACEAE
- Astragalus amphioxys* Gray var. *amphioxys* (C;SID,MD,PJ)  
*Astragalus amphioxys* Gray var. *vespertinus* (Sheld.) Jones (C;W)  
*Astragalus argophyllus* Nutt. var. *martinii* Jones (U;PJ,PM)  
*Astragalus asclepiadoides* Jones (C;SID)  
*Astragalus brandegei* Porter (U;SID,MD,PJ)  
*Astragalus calycosus* Torr. (O;SID,MD,PJ)  
*Astragalus ceramicus* Sheldon (U;WR)  
*Astragalus coltonii* Jones var. *coltonii* (C;SID,MD,PJ)  
*Astragalus convallarius* Greene var. *convallarius* (U;PJ,PM)  
*Astragalus cymboides* Jones (C;SID,MD,PJ)  
*Astragalus desperatus* Jones var. *desperatus* (C;SnD,MD,PJ)
- Astragalus desperatus* Jones var. *petrophilus* Jones (C;MD,SnD,PJ)  
*Astragalus episcopus* Wats. (C;MD,PJ)  
*Astragalus flavus* Nutt. var. *argillosus* (Jones) Barneby (C;SID)  
*Astragalus flavus* Nutt. var. *flavus* (C;SID,MD,PJ)  
*Astragalus flexuosus* (Hook.) Don. var. *diehlii* (Jones) Barneby (O;SID,MD,PJ)  
*Astragalus geyeri* Gray (O;MD)  
*Astragalus kentrophyta* Gray var. *coloradoensis* Jones (U;WR,RO)  
*Astragalus kentrophyta* Gray var. *elatus* Wats. (R;SID)  
*Astragalus lentiginosus* Dougl. var. *araneosus* (Sheld.) Barneby (C;MD,PJ)  
*Astragalus lentiginosus* Dougl. var. *palans* (Jones) Jones (C;MD,PJ)  
*Astragalus lonchocarpus* Torr. (C;SID,MD,PJ)  
*Astragalus moencoppensis* Jones (C;SID,MD,PJ)  
*Astragalus mollissimus* Torr. var. *thompsonae* (Wats.) Barneby (C;W)  
*Astragalus musiniensis* Jones (C;SID,MD,PJ)  
*Astragalus pardalinus* (Rydb.) Barneby (O;SnD,MD,PJ)  
*Astragalus praelongus* Sheld. var. *ellisiae* (Rydb.) Barneby (C;SID)  
*Astragalus praelongus* Sheld. var. *praelongus* (U;SID)  
*Astragalus preussii* Gray var. *preussii* (C;SID,MD,PJ)  
*Astragalus rafaelsenis* Jones (O;SID)  
*Astragalus sabulorum* Gray (O;PJ,PM)  
*Astragalus spatulatus* Sheld. (O;PJ,PM)  
*Astragalus subcinereus* Gray var. *basalticus* Welsh (R;PJ)  
*Astragalus tenellus* Pursh (O;MD,PJ)  
*Astragalus wingatanus* Wats. (R;SID,MD,PJ)  
*Astragalus woodruffii* Jones (U;SnD,MD)  
*Dalea flavescens* (Wats.) Welsh (O;SnD,MD,PJ)  
*Dalea oligophylla* (Torr.) Shinnars (O;WR,RO)  
*Glycyrrhiza lepidota* Pursh (C;WR,SS)  
*Hedysarum boreale* Nutt. (C;MD,PJ,PM)  
*Hoffmanseggia repens* (Eastw.) Cockerell (C;SnD)  
*Lathyrus brachycalyx* Rydb. var. *eucosmus* (Butters & St. John) Welsh (U;WR)  
*Lupinus argenteus* Pursh var. *argenteus* (R;WR)  
*Lupinus argenteus* Pursh var. *tenellus* Dougl. (U;MD)  
*Lupinus brevicaulis* Wats. (U;SID,MD)  
*Lupinus pusillus* Pursh var. *pusillus* (C;SID,MD,PJ)  
*Lupinus pusillus* Pursh var. *rubens* (Rydb.) Welsh  
*Medicago sativa* L. (C;WR)  
*Melilotus alba* Medicus (O;SS,WR)  
*Melilotus officinalis* (L.) Lam. (O;SS,WR)  
*Oxytropis lambertii* Pursh var. *bigelovii* Gray (R;PJ,PM)  
*Oxytropis sericea* Nutt. (O;MD,PJ)  
*Psoralea lanceolata* Pursh var. *lanceolata* (U;MD,PJ)  
*Psoralea lanceolata* Pursh var. *stenophylla* (Rydb.) Toft & Welsh (O;WR)  
*Psorothamnus polyadenius* (Torr.) Rydb. var. *jonesii* Barneby (R;SID,MD)  
*Psorothamnus thompsonae* (Vail) Welsh & Atwood (R;MD)  
*Robinia pseudoacacia* L. (R;WR)  
*Sophora stenophylla* Gray (O;MD)
- FUMARIACEAE
- Corydalis aurea* Willd. (R;PJ)

## GENTIANACEAE

- Swertia albomarginata* (Wats.) Kuntze (R;PM)  
*Swertia utahensis* (Jones) St. John (C;SnD,MD)

## HYDROPHYLLACEAE

- Phacelia constancei* Atwood (R;SID)  
*Phacelia corrugata* Nels. (C;W)  
*Phacelia demissa* Gray var. *demissa* (O;SID,PJ)  
*Phacelia demissa* Gray var. *heterotricha* Howell  
*Phacelia indecora* Howell (R;SID)  
*Phacelia ivesiana* Torr. (C;SID,MD,PJ)  
*Phacelia rafaelsensis* Atwood (C;MD,PJ)

## JUNCACEAE

- Juncus arcticus* Willd. (C;SS)  
*Juncus balticus* Willd. (C;SS)  
*Juncus nodosus* L. (U;SS)  
*Juncus torreyi* Coville (O;SS)

## JUNCAGINACEAE

- Triglochin maritima* L. (U;SS)

## LAMIACEAE

- Poliomnitha incana* (Torr.) Gray (C;SnD)

## LILIACEAE

- Allium geyeri* Wats. (C;PJ,PM)  
*Allium macropetalum* Rydb. (U;SID)  
*Allium textile* Nels. & Macbr. (C;SnD)  
*Androstephium breviflorum* Wats. (C;SID,MD,PJ)  
*Asparagus officinalis* L. (O;WR,SS)  
*Calochortus nuttallii* T. & G. (C;SID,MD)  
*Eremocrinum albomarginatum* (Jones) Jones (C;SnD)  
*Smilacina stellata* (L.) Desf. (C;HG)  
*Yucca harrimaniae* Trel. (C;SnD,MD,PJ)

## LINACEAE

- Linum aristatum* Engelm. (U;WR)  
*Linum perenne* L. (C;WR)  
*Linum puberulum* (Engelm.) Heller (O;SID)  
*Linum subterres* Winkler (O;WR,PJ)

## LOASACEAE

- Mentzelia albicaulis* Dougl. (C;SID,MD,PJ)  
*Mentzelia humilis* (Gray) Darl. (U;WR)  
*Mentzelia multiflora* (Nutt.) Gray (C;SnD)  
*Mentzelia pterosperma* Eastw. (U;WR)  
*Mentzelia pumila* (Nutt.) T. & G. (O;WR)

## MALVACEAE

- Sphaeralcea coccinea* (Nutt.) Rydb. (C;W)  
*Sphaeralcea grossularifolia* (Hook. & Arn.) Rydb. (O;SnD,MD)  
*Sphaeralcea leptophylla* (Gray) Rydb. (R;WR)  
*Sphaeralcea munroana* (Dougl.) Spach  
*Sphaeralcea parvifolia* Nels. (C;W)  
*Sphaeralcea psoraloides* Welsh (R;SID,MD)

## NYCTAGINACEAE

- Abronia elliptica* Nels. (C;SnD,MD,WR)  
*Abronia nana* Wats. (U;SID,PJ)  
*Allionia incarnata* L.  
*Oxybaphus linearis* (Pursh) Robins. (C;W)  
*Tripterocalyx micranthus* (Torr.) Hook. (O;SnD)

## OLEACEAE

- Fraxinus anomala* Torr. in Wats. (C;WR)

## ONAGRACEAE

- Calylophus lavandulaefolia* (T. & G.) Raven (O;PJ,RO)  
*Camissonia eastwoodiae* (Munz) Raven (C;SnD,SID)  
*Camissonia scapoidea* (T. & G.) Raven (C;SnD,SID)  
*Camissonia walkeri* (Nels.) Raven (U;SID,MD)  
*Oenothera brachycarpa* (Gray) Britt. (U;MD,PJ,WR)  
*Oenothera caespitosa* Nutt. (C;SnD,MD,WR)  
*Oenothera pallida* Lindl. ssp. *pallida* (C;SnD,MD,WR)

- Oenothera pallida* Lindl. ssp. *trichocalyx* (Nutt.) Muuz & Klein (C;SID,MD)

## ORCHIDACEAE

- Epipactis gigantea* Dougl. ex Hook. (C;HG,SS)

## OROBANCHACEAE

- Orobanche fasciculata* Nutt. (O;W)

## PAPAVERACEAE

- Argemone corymbosa* Greene (C;SnD)  
*Argemone munita* Dur. & Hilg. (C;SnD)

## PINACEAE

- Pinus edulis* Engelm. (C;PJ,PM)  
*Pinus ponderosa* Lawson (C;PM)  
*Pseudotsuga menziesii* (Mirb.) Franc. (C;PM)

## PLANTAGINACEAE

- Plantago patagonica* Jacq. (C;SID,MD)

## POACEAE

- Agropyron caninum* (L.) Beauv. (U;MD,RO)  
*Agropyron cristatum* (L.) Gaertn. (C;MD,PJ)  
*Agropyron spicatum* (Pursh) Scribn. & Smith (U;PJ)  
*Agropyron trachycaulum* (Link) Malte (U;WR)  
*Andropogon hallii* Hackel (R;WR)  
*Aristida purpurea* Nutt. (C;W)  
*Bouteloua curtipendula* (Michx.) Gray (R;MD)  
*Bouteloua gracilis* (H.B.K.) Lag. ex Steud. (C;SID,MD,PJ)  
*Bromus japonicus* Thunb. (R;PJ)  
*Bromus tectorum* L. (C;WR,DS)  
*Calamagrostis scopulorum* Jones (U;WR)  
*Dichanthelium lanuginosum* (Elliott) Gould (U;SS)  
*Distichlis spicata* (L.) Greene var. *stricta* (Torr.) Scribn. (C;SID,WR)

- Elymus canadensis* L. (U;WR)  
*Elymus cinereus* Scribn. & Merr. (O;MD,PJ)  
*Elymus junceus* Fischer (R;SID,MD)  
*Elymus salina* Jones (C;PJ)  
*Erioneuron pilosum* (Buckley) Nash (C;MD,RO,WR)  
*Erioneuron pulchellum* (H.B.K.) Tateoka (R;PJ)  
*Festuca pratensis* Huds. (U;SS)  
*Hilaria jamesii* (Torr.) Benth. (C;W)  
*Hordeum jubatum* L. (C;WR)  
*Muhlenbergia asperifolia* (Nees & Mey.) Parodi (O;WR)  
*Muhlenbergia pungens* Thurber (C;SnD)  
*Munroa squarrosa* (Nutt.) Torr. (O;PJ)  
*Oryzopsis hymenoides* (Roem. & Schult.) Ricker (C;W)

- Oryzopsis micrantha* (Trin. & Rupr.) Thurber (U;PJ)  
*Panicum virgatum* L. (O;SS,WR)  
*Phragmites australis* (Car.) Trin. ex Steud. (C;SS)  
*Poa fendleriana* (Steud.) Vasey (O;PJ,PM)  
*Poa pratensis* L. (U;SS,WR)  
*Poa sandbergii* Vasey (U;PJ)  
*Polypogon monspeliensis* (L.) Desf. (U;SS,WR)  
*Schedonnardus paniculatus* (Nutt.) Trel. (R;SID)  
*Schizachyrium scoparium* (Michx.) Nash (O;PJ,WR)  
*Sitanion hystrix* (Nutt.) Smith (C;W)  
*Spartina gracilis* Trin. (U;SS)  
*Sporobolus airoides* (Torr.) Torr. (C;SID,MD)  
*Sporobolus contractus* Hitchc. (O;MD,PJ,WR)  
*Sporobolus cryptandrus* (Torr.) Gray (C;SID,MD,PJ)  
*Sporobolus flexuosus* (Thurb.) Rydb. (U;SnD,WR)  
*Sporobolus giganteus* Nash  
*Stipa arida* Jones (U;WR)  
*Stipa comata* Trin. & Rupr. (C;MD,PJ)  
*Stipa columbiana* Macoun. (U;PJ)

- Stipa speciosa* Trin. & Rupr. (U;PJ)  
*Vulpia octoflora* (Walt.) Rydb. (O;PJ,WR)
- POLEMONIACEAE**  
*Cilia aggregata* (Pursh) Spreng. (C;W)  
*Cilia congesta* Hook. (O;SID)  
*Cilia gunnisonii* T. & G. (C;MD,WR)  
*Cilia inconspicua* (Smith) Sweet (C;PJ)  
*Cilia latifolia* Wats. (R;RO,WR)  
*Cilia leptomeria* Gray (C;SnD,MD,PJ)  
*Cilia polycladon* Torr. in Emory (O;SID)  
*Cilia pumila* Nutt. (O;SID)  
*Cilia roseata* Rydb. (C;WR,RO)  
*Cilia stenothyrsa* Gray (O;PJ)  
*Leptodactylon caespitosum* Nutt. (U;WR)  
*Leptodactylon pungens* (Torr.) Nutt. (O;MD,WR,RO)  
*Leptodactylon watsonii* (Gray) Rydb. (U;WR,RO)  
*Phlox austromontana* Cov. (O;PJ)  
*Phlox hoodii* Rich. (C;MD,PJ)  
*Phlox longifolia* Nutt. (O;SID,MD)
- POLYGALACEAE**  
*Polygala acanthoclada* Gray (R;MD)  
*Polygala subspinosa* Wats. (C;SID,PJ,RO)
- POLYGONACEAE**  
*Eriogonum alatum* Torr. in Sitgr. (C;PJ)  
*Eriogonum batemanii* Jones (C;PJ)  
*Eriogonum bicolor* Jones (C;MD,PJ)  
*Eriogonum cernuum* Nutt. (C;SID)  
*Eriogonum corymbosum* Benth. var. *corymbosum* (C;SID,MD)  
*Eriogonum fasciculatum* Benth. var. *polifolium* (Benth. in DC.) T. & G. (R;MD)  
*Eriogonum flexum* Jones (R;SID)  
*Eriogonum gordonii* Benth. (U;SID,MD)  
*Eriogonum hookeri* Wats. (O;MD,PJ)  
*Eriogonum inflatum* Torr. & Frem. var. *fusiforme* (Small) Reveal (O;SID,MD,PJ)  
*Eriogonum inflatum* Torr. & Frem. var. *inflatum* (C;SID,MD)  
*Eriogonum jamesii* Benth. var. *flavescens* Wats. (C;MD,PJ,WR)  
*Eriogonum leptocladon* T. & G. var. *leptocladon* (C;SID)  
*Eriogonum microthecum* Nutt. var. *foliosum* (T. & G.) Reveal (O;SID)  
*Eriogonum ovalifolium* Nutt. var. *ovalifolium* (C;W,RO)  
*Eriogonum salsuginosum* (Nutt.) Hook. (O;MD,PJ)  
*Eriogonum shockleyi* Wats. var. *longilobum* (Jones) Reveal (C;SID,MD)  
*Eriogonum smithii* Reveal  
*Eriogonum tumulosum* (Barneby) Reveal (U;PJ)  
*Eriogonum wetherillii* Eastw. (O;W)  
*Polygonum aviculare* L. (O;WR,DS)
- POLYPODIACEAE**  
*Adiantum capillus-veneris* L. (U;HG)  
*Cheilanthes feei* Moore (O;HG)  
*Pellaea glabella* Mett. ex Kuhn (R;HG)
- PORULACEAE**  
*Portulaca oleracea* L. (R;PJ,PM)  
*Talinum validulum* Greene (O;PJ)
- RANUNCULACEAE**  
*Aquilegia micrantha* Eastw. (C;HG)  
*Clematis ligusticifolia* Nutt. (C;WR)  
*Delphinium nuttallianum* Pritz. ex Walp. (O;W)  
*Delphinium scaposum* Greene (O;PJ)
- Ranunculus cymbalaria* Pursh (U;SS)  
*Ranunculus testiculatus* Crantz (O;DS)
- ROSACEAE**  
*Amelanchier utahensis* Koehne (C;WR,SS)  
*Cercocarpus intricatus* Wats. (C;PJ,RO)  
*Cercocarpus montanus* Raf. (C;PJ,PM,WR)  
*Coleogyne ramosissima* Torr. (C;SnD)  
*Cowania mexicana* D. Don (C;PJ)  
*Fallugia paradoxa* (D. Don) Endl. (O;WR)  
*Physocarpus alternans* (Jones) Howell  
*Physocarpus monogynus* (Torr.) Cou. (U;PJ)  
*Purshia tridentata* (Pursh) DC. (O;WR)  
*Rosa woodsii* Lindl. (R;PM)
- RUBIACEAE**  
*Galium multiflorum* Kellogg (O;WR)
- SALICACEAE**  
*Populus x acuminata* Rydb. (U;WR,SS)  
*Populus angustifolia* James ex Torr. (O;WR)  
*Populus fremontii* Wats. (C;WR,SS)  
*Populus tremuloides* Michx. (O;PM)  
*Salix exigua* Nutt. (C;SS)
- SANTALACEAE**  
*Comandra umbellata* (L.) Nutt. var. *pallida* (DC.) Jones (C;W,WR)
- SAXIFRAGACEAE**  
*Philadelphus microphyllus* Gray (C;PJ,PM)  
*Ribes cereum* Dougl. (R;PJ,PM)  
*Ribes leptanthum* Gray (O;PM)
- SCROPHULARIACEAE**  
*Castilleja chromosa* Nels. (O;W)  
*Castilleja linariaefolia* Benth. (O;SS)  
*Castilleja scabrida* Eastw. (C;W)  
*Cordylanthus kingii* Wats. (O;PJ)  
*Cordylanthus wrightii* Gray  
*Mimulus rubellus* Gray (R;PM)  
*Penstemon carnosus* Pennell (C;PJ)  
*Penstemon cyanocaulis* Payson (U;WR)  
*Penstemon eatonii* Gray (O;PJ,PM)  
*Penstemon lentus* Pennell (U;WR)  
*Penstemon utahensis* Eastw. (C;PJ)
- SELAGINELLACEAE**  
*Selaginella nutica* Eaton ex Underw. (U;HG)
- TAMARICACEAE**  
*Tamarix ramosissima* Ledeb. (C;SS,WR)
- TYPHACEAE**  
*Typha latifolia* L. (C;SS)
- ULMACEAE**  
*Celtis reticulata* Torr. (U;WR)  
*Ulmus pumila* L. (R;WR)

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